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## (54) A COLUMN FOR A MACHINE TOOL

(71) We, FRITZ STUDER AG., a Swiss Body Corporate of Glockenthal, Thun/Switzerland do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to a column for a machine tool, such as a grinding machine.

One known form of such a column is formed of concrete, using sand, gravel or broken natural or artificial rocks (for example clinker) as an aggregate and cement, preferably Portland cement as a bonding agent. In most cases grey cast iron or steel members are cast into the concrete structure, whereby subsequent precise machining takes place for the construction of guideways or tracks and the attachment of additional units. As conventional concrete is only able to transmit very limited tensile stresses in all cases when it is used for columns, reinforcements must be provided, in a similar manner to that used in other reinforced or prestressed concrete constructions.

Machine columns made from conventional concrete have a number of considerable disadvantages. Even after the setting and complete hardening of concrete it absorbs water to a greater or lesser extent, depending on the atmospheric humidity, and correspondingly varies its shape over a long period. Such dimensional changes can cause difficulties in columns for machine tools, particularly for grinding machines in which it is important to have constant high dimensional accuracy. Machine tool columns are exposed to the continuous influence of cutting liquids generally petroleum-based cutting liquids, which can cause disintegration of conventional concrete after prolonged use. Protection of the concrete by artificial resin-based paints is often inadequate, be-

cause the paint is generally severely damaged on resetting the machine or by being struck by swarf or metal chips from the machine tool. Conventional concrete is subject to considerable shrinkage during the setting and hardening process, which lasts about thirty days and therefore has large internal stresses within itself and when casting in metal inserts. This causes cracks to form in the machine tool columns and to deformations of the cast-in metal inserts, thus seriously prejudicing the precision required from a machine tool.

According to the present invention there is provided a column for a machine tool, for example, a grinding machine, formed at least in part by an aggregate of sand, gravel or broken natural or artificial rocks (for example clinker) bonded with a synthetic resin which on hardening and on any change of humidity undergoes substantially no change of volume, said column including a guide surface or mount for a tool or carriage.

With such a construction it is possible to obviate continuous dimensional changes to the column due to varying atmospheric humidity, to eliminate the harmless influence of cutting liquids and to reduce to a harmless minimum the stresses caused by high levels of shrinkage.

Synthetic resin can be used as the bonding material for all of the column or for parts only. In the latter case it can be used only for those parts which are decisive for high precision and exposed to the influence of cutting liquids or metal chips, whilst the remaining parts can be produced according to the conventional concrete construction procedure.

In order that the invention will be better understood, the following description is given, merely by way of example, reference being made to the accompanying drawing, in which:—

Figure 1 is a cross-section through one embodiment of column according to the invention; and

Figure 2 is a cross-section through a further embodiment of column, which for economic reasons, is made from different material mixtures.

The column 1 shown in the drawing is made from a mixture of sand and gravel bonded with a synthetic resin bonding material. A block of foam material 2 is cast into the column 1 in order to save material and weight. Metal mounting blocks 3 are cast into the underside of the column 1 as erection aids, whilst guides 4 are formed from a synthetic resin having a low coefficient of friction. The formation of guides 4 may be carried out by spacing a mould part 10 (Fig. 2) a particular distance from column 1, and by subsequently pouring or injecting into the space produced an artificial resin cross-linked with a lubricant, for example, molybdenum disulphide. In order to be able to remove the mould part 10 after hardening of guides 4, the mould part is treated with a release agent. Metal inserts 5 are cast into the column 1 for the mounting of additional units.

If column 1 is to be constructed with two different bonding materials as shown, for example, in Figure 2, the part 6 of the column is bonded with synthetic resin, whilst the part 7 is constructed in conventional manner from reinforced concrete with reinforcement 8. Here again mounting blocks 3, inserts 5 and guides 4 are cast-in. Part 6 and part 7 constructed with different bonding materials are separated by a deformable intermediate layer 9, for example, an elastomer such as rubber or polychloroprene.

Through the use of synthetic resin as the bonding material it is possible to prevent deformations of a machine column as a function of the atmospheric humidity. Since during setting a column shrinks only slightly if synthetic resin is used as the bonding material, only negligible internal stresses build up in the column and its connecting surfaces with cast-in metal parts. Columns which are made wholly from synthetic resin-bonded concrete or are only made therefrom at the parts exposed to cooling liquid, do not disintegrate under the influence of the cooling

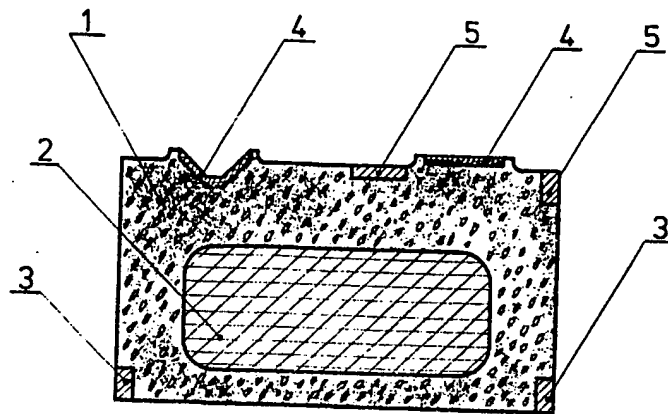
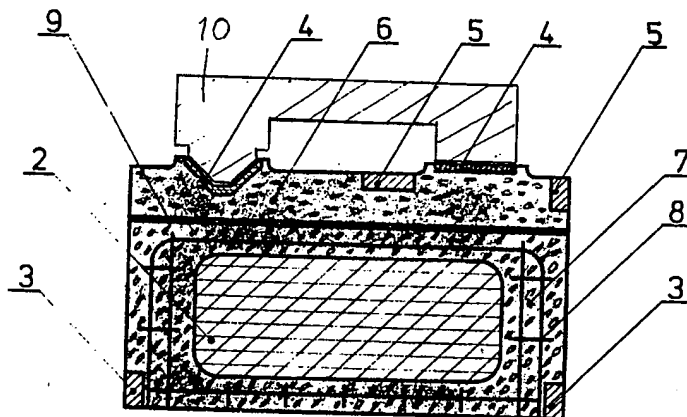
liquid and need not be protected by special measures. Thus, a high level of operating reliability is obtained and the column is manufactured more economically.

Epoxy and polyester resins are particularly suitable as synthetic resin bonding materials; other thermoplastic synthetic resins such as polyamide resins may also be used.

#### WHAT WE CLAIM IS:

1. A column for a machine tool, for example, a grinding machine, formed at least in part by an aggregate of sand, gravel or broken natural or artificial rocks (for example clinker) bonded with a synthetic resin which on hardening and on any change of humidity undergoes substantially no change of volume, said column including a guide surface or mount for a tool or carriage.
2. A column according to Claim 1, wherein synthetic resin is used as the bonding material only for those parts which are decisive for precision purposes.
3. A column according to Claim 1 or 2, wherein synthetic resin is used as the bonding material only for those parts which are subject to the influence of cutting liquids.
4. A column according to either of the Claims 2 or 3, wherein the other parts of the column are formed by conventional concrete material and between the parts which are bonded with synthetic resin and the parts of conventional concrete a deformable intermediate layer is incorporated.
5. A column according to any one of the preceding claims, wherein the synthetic resin used is a curable multicomponent synthetic resin, for example an epoxy or polyester resin.
6. A column according to any one of claims 1 to 4, wherein the bonding material used is a thermoplastic synthetic resin, for example, polyamide resin.
7. A column for a machine tool substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

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Fig.1Fig.2

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TITLE: Stand for machine tool and measuring machine - composed  
of polyamide-,epoxy!-,or polyester-bonded finely or  
coarsely comminuted stones

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BASIC-ABSTRACT:

Machine column or stand for machine tools pref. milling and grinding machines  
and measuring (sic) machines is made of a mixt. of sand, grit or gravel of  
natural or synthetic stones such as coal slag, bonded together with a plastics  
binder.

A plastics binder is used only for those sections of the column which affect  
the accuracy of machine operation and/or those that are subjected to the action  
of cutting liqs.. The binder is thermoplastics e.g. a polyamide resin, or a  
curable multi-component plastics, e.g. an epoxy or a polyester resin. Other  
sections of the column are bonded with conventional concrete.

TITLE-TERMS: STAND MACHINE TOOL MEASURE MACHINE COMPOSE POLYAMIDE  
POLYEPOXIDE  
POLYESTER BOND FINE COARSE COMMUNUTE STONE

DERWENT-CLASS: A88 P56 P61 Q42

CPI-CODES: A12-A; A12-H;

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